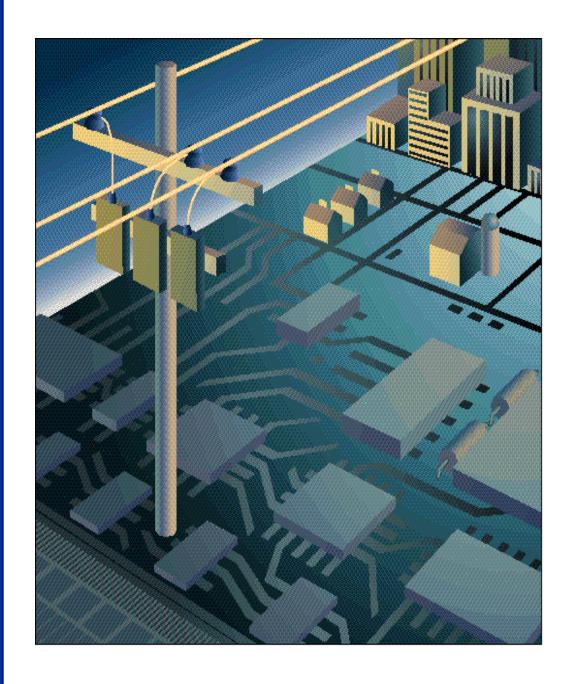
PIER Energy Systems Integration

Distributed Energy Resources (DER) Business Model Analysis

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Arthur D Little



- 1 Why study business models?
- 2 What have we learned so far?
- 3 Where are we going from here?



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Last summer, Arthur D. Little examined where gaps exist in making DER a significant resource for California.

Are there research, development, demonstration or commercialization gaps in making DER a significant resource in California's power system?

Interconnection

Can a substantial amount of DER be interconnected in both radial and networked distribution systems?

Grid Effects

Would a high penetration of DER have adverse impacts and/or positive effects on the T&D system?

Market Integration

Can DER access robust markets or be exposed to price signals that will maximize benefits to customers and the power system?

This work was performed for the Energy Systems Integration PIER Program Area.



Through the course of this work we uncovered some underlying themes that need to be considered when setting priorities.

- Interconnection "We have just seen the tip of the iceberg"
- Grid effects rather than grid impacts
- Microgrids The new, new thing?
- Business Models Apple or Microsoft?
- It's the policy, stupid!
- Integration/ Optimization/ Operation



Lack of a clear successful business model is inhibiting the development of the DER industry.

- DER's long-term success will rely on business models based on highly integrated relationships and interactions between suppliers, operators and customers.
- It is still too early to tell which business models will ultimately be successful. However, lack of a clear successful business model:
 - prevents significant private industry investment,
 - obscures a clear path for technology development,
 - and creates difficulty in understanding and prioritizing necessary regulatory changes
- Breaking DER out of this cycle may be possible by analyzing business models and encouraging the most attractive.



CEC and Arthur D. Little are currently analyzing DER business models.

The key objectives of this project are to:

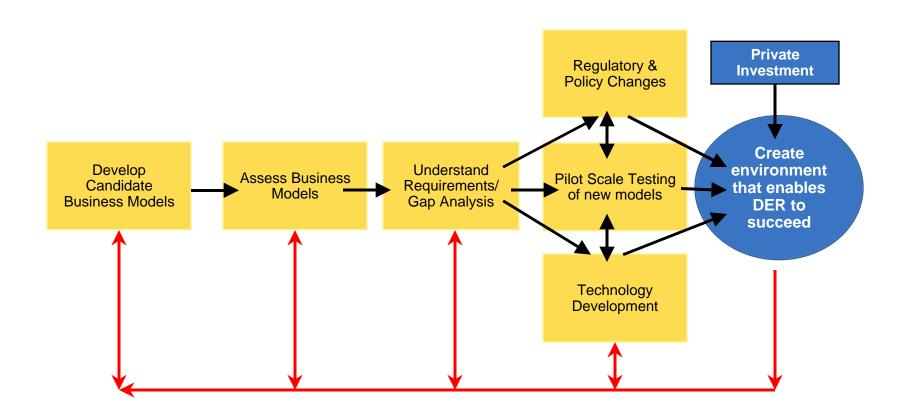
- Identify the most attractive value networks from CEC's perspective
- Identify the technology, regulatory and infrastructure requirements for value networks to succeed
- Identify the technology, regulatory and infrastructure requirements that are common to all the value networks

This project is not trying to:

- Produce an exhaustive listing of possible business models
- Pick the "winning" business models



Ultimately this should lead to creating an environment that enables DER to succeed.

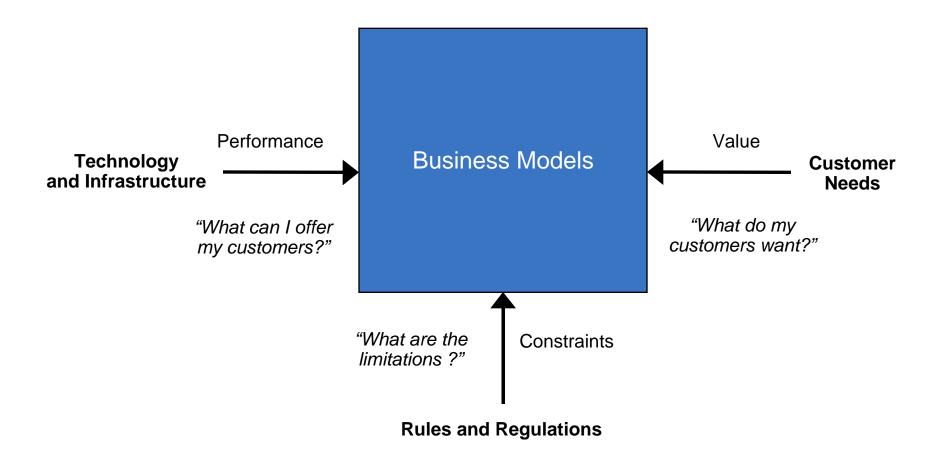




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Business models are driven by customer needs, technology and infrastructure, and rules and regulations.





Business models work together in a value network that supports a value proposition to the customer.

Business Model

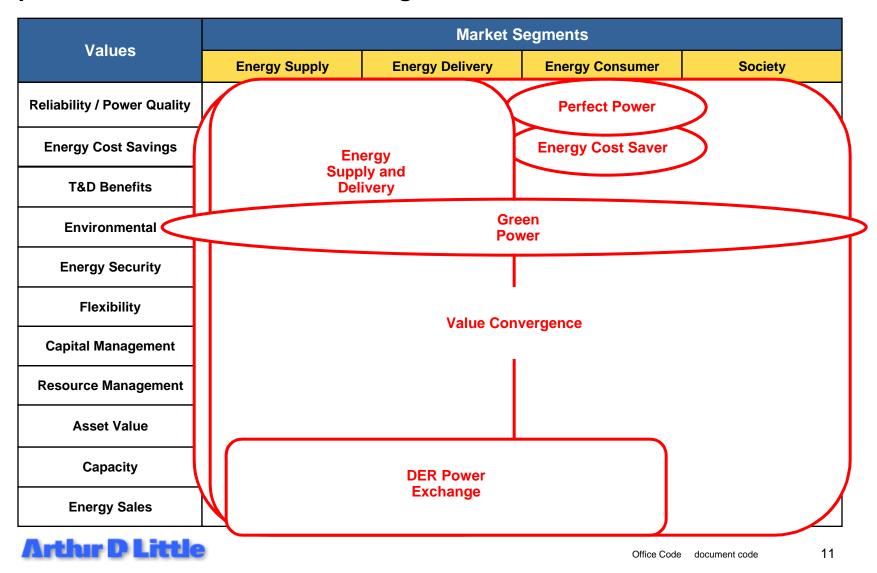
Defines how a company makes money

- value proposition
- market segment
- value chain
- cost structure and profit potential
- supplier/customer linkages
- competitive strategy

Value Network A group of business models that interact to support a value proposition to a "DER user" market segment



Value Networks were identified by examining the values that DER can provide to the different market segments.



DER will need innovation around business models as much as technology development.

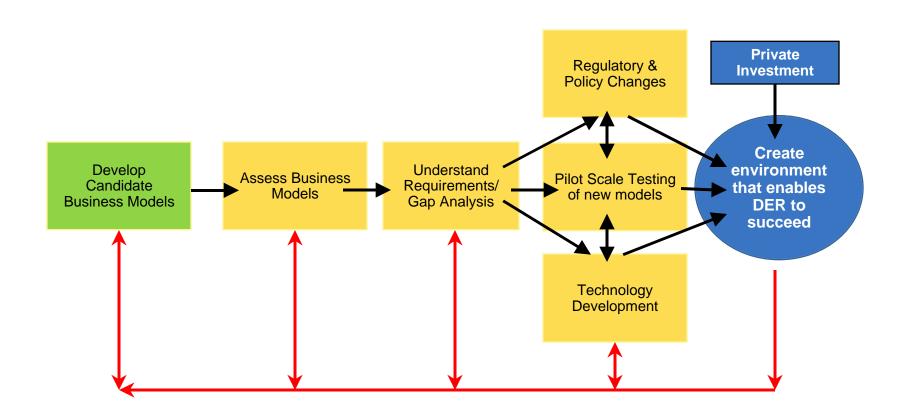
- DER will need new and many business models to be successful
 - New technology needs innovation around business models
 - DER will likely need to iterate around a number of business models
 - More available business models = greater DER success
- Each value network has different needs.
 - Some require regulatory changes rather than technology improvements
 - Some are driven more by hardware improvements while by software.
 - More value = more complex value network = complicated regulatory issues
- Lack of clear successful business models is a symptom of technology, infrastructure, and regulatory constraints
 - Many different business models are being considered by industry
 - Much of the debate hinges on these different business models
 - Technology, infrastructure and/or regulatory constraints are preventing implementation



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The next steps are to assess the value networks and understand the requirements.



We expect to complete this work over the next two months.



Conclusions

- Understand that business models are important to DER's success, however they are often overlooked and misunderstood.
- Encourage many business models as part of your strategy.
- Use business models as a powerful tool in building a robust strategy:
 - Understand private industry
 - Uncover alternatives
 - Test the strategy

